

Thiamethoxam and Drinking Water

Summary

Thiamethoxam is a pesticide used at a household and industrial level on crops, ornamental plants, yards, and turf. Thiamethoxam has been detected in Minnesota groundwater and surface water at levels below the guidance value developed by MDH. People can be exposed to thiamethoxam by eating or drinking contaminated food or water or when spending time in an area that was recently treated with thiamethoxam. Exposure to high levels of thiamethoxam over time has been shown to cause adverse developmental, male and female reproductive, and liver effects in animal studies.¹ Minnesotans are not likely to experience health effects from the levels of thiamethoxam found in the environment.

Thiamethoxam

Thiamethoxam is a neonicotinoid pesticide that helps protect against sucking and chewing insects—like aphids, thrips, and beetles. This pesticide is used on a variety of crops, including corn and soybeans. Thiamethoxam is also used to protect livestock pens, poultry houses, sod farms, golf courses, lawns, household plants, and Christmas trees.² Thiamethoxam is also used to treat seed and to preserve wood. Over the past decade, the use of thiamethoxam has increased dramatically throughout the Midwest.³

Thiamethoxam in Minnesota Waters

The Minnesota Department of Agriculture (MDA) monitors surface water, groundwater, and drinking water for many pesticides, including thiamethoxam. In 2014, MDA found thiamethoxam in five percent of groundwater samples and 11 percent of surface water samples. They did not detect thiamethoxam in drinking water. The maximum level of thiamethoxam MDA detected in groundwater was 1.365 parts per billion (ppb) and 0.223 ppb in surface water.⁴

MDH Guidance Value

Based on available information, MDH developed a guidance value of 200 ppb for thiamethoxam in drinking water. A person drinking water at or below the guidance value would have little or no risk for health effects.

Potential Exposure to Thiamethoxam

People can be exposed to thiamethoxam through drinking contaminated water or eating contaminated food. The EPA has set limits on the amount of thiamethoxam and clothianidin (a chemical produced when thiamethoxam breaks down) residues allowed in various food products to reduce this exposure. People spending time in an area recently treated with thiamethoxam, applying thiamethoxam, or working with thiamethoxam-coated seeds can be exposed through skin contact or by breathing it in.

Potential Health Effects

Animal testing showed that short-term exposure to high levels of thiamethoxam caused adverse developmental, female reproductive, and liver effects. Animals exposed to thiamethoxam for longer durations, but at lower doses, experienced changes to the male reproductive system.

Using Thiamethoxam Safely

People who use thiamethoxam should follow product label directions. Wash your hands thoroughly with soap and water after handling thiamethoxam and before eating or drinking. People and pets should not re-enter an area treated with thiamethoxam until the product has dried completely.

Thiamethoxam in the Environment

Thiamethoxam enters the environment through a variety of agricultural and residential uses including coated seeds, spraying, and aerial application. Thiamethoxam can be carried into surface water by storm water runoff, soil erosion, or spray drift. Thiamethoxam breaks down in less than 60 days in the environment. One of the chemicals thiamethoxam breaks down into is another pesticide called clothianidin, which takes years to break down in soil.⁵ These pesticides move quickly through soil and are the most frequently detected neonicotinoids in Minnesota.⁶

Potential Environmental Impacts of Thiamethoxam

Because thiamethoxam is an insecticide, insects and aquatic invertebrates are most likely to be affected by low levels of thiamethoxam in the environment. Minnesota does not have an aquatic life water quality standard for thiamethoxam. The highest measured concentration of thiamethoxam in Minnesota surface waters is below the US Environmental Protection Agency's (US EPA) current benchmark values. Organisms living on land are also affected and it is likely that thiamethoxam harms and kills insects that pollinate plants, like bees.⁷

Health Risk Assessment Unit

The MDH Health Risk Assessment Unit evaluates the health risks from contaminants in groundwater. MDH works in collaboration with the Minnesota Pollution Control Agency and the Minnesota Department of Agriculture to understand the occurrence and environmental effects of contaminants in water.

References

1. US Environmental Protection Agency Federal Register. 2013. Vol. 78, no. 59. Accessed August 2015. <http://www.gpo.gov/fdsys/pkg/FR-2013-03-27/html/2013-06759.htm>
2. US Environmental Protection Agency. 2011. Thiamethoxam: health assessment scoping document in support of registration review. Accessed September 2015. <https://www.regulations.gov/#!documentDetail;D=EPA-HQ-OPP-2011-0581-0005>
3. Hladik M, Kolpin D, & Kuivila K. 2014. Widespread occurrence of neonicotinoid insecticides in streams in a high corn and soybean producing region, USA. *Environmental Pollution*, 193, 189-196.
4. Minnesota Department of Agriculture. 2015. 2014 Water Quality Monitoring Report. Accessed August 2015. <http://www.mda.state.mn.us/chemicals/pesticides/~media/Files/chemicals/maace/wqm2014rpt.pdf>
5. US National Library of Medicine. Hazardous Substances Data Bank. Searched "clothianidin". Accessed July 2015. <http://toxnet.nlm.nih.gov>
6. Minnesota Department of Agriculture. 2016. Review of Neonicotinoid Use, Registration, and Insect Pollinator Impacts in Minnesota. Accessed August 2016. www.mda.state.mn.us/~media/Files/chemicals/reviews/neonicroviewrpt2016.pdf.
7. US Environmental Protection Agency. 2011. Problem Formulation for the Environmental Fate, Ecological Risk, Endangered Species, and Drinking Water Exposure Assessments in Support of the Registration Review of Thiamethoxam. Accessed August 2016. <https://www.regulations.gov/document?D=EPA-HQ-OPP-2011-0581-0003>

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